Mottling in citrus leaves.—JENSEN[22] has attempted to see whether there is any relation between mottling of *Citrus* leaves and the supply of nutrient salts necessary for chlorophyll formation. Such was thought possible since the Office of Biophysical Investigations had found that mottling is inversely proportional to the humus content of the soil, and that decomposing organic matter increases the soluble salts in the soil of the groves. The following statements from his summary indicate the results of the investigation: "Judged by a comparison of the average percentages of the inorganic elements determined in healthy *Citrus* leaves and in leaves in the medium stages of mottling, the data obtained did not show that the initial mottling could be accounted for by deficiency in the transfer of the iron, calcium, magnesium, and phosphoric acid from the conducting system of the leaf stem and midrib to the mesophyll tissue. On the other hand, sharply localized yellow areas in old orange leaves contained less of these elements than the adjoining green areas (mostly veins), but whether that relation obtained in the initial stage of mottling was not determined. In very badly mottled *Citrus* leaves there was in general an increase in the percentage of these elements in the conducting tissues, including the leaf stems, indicating difficulty in their transfer to the mesophyll tissues in very advanced stages of mottling, probably because the leaf had become functionless."

The process of mottling is seemingly very complex, involving as it likely does an unusually rapid decomposition of chlorophyll and not merely a cessation in chlorophyll formation. This problem may yield to solution, if at all, only after a many-sided attack. In some of the algae, however, loss of chlorophyll seems to be a direct result of shortage of nitrate supply. Work of this Office seems to exclude this as a possibility in *Citrus* plants, as well as to indicate the complex nature of the process.—WM. CROCKER.

Monocotyledony.—WORSDELL[23] has criticized the reviewer's view of monocotyledony in a paper which "is an astonishing one." In fact, we seem to be mutually astonished, neither being able to understand the reasoning of the other. The paper opens with an account of "an uncommon abnormality," which consists of a "forked coleoptile" in a corn seedling, and this phenomenon is the excuse for the rest of the paper. It may be well to record that this "forked coleoptile" is a very common phenomenon, as all know who have had much to do with corn seedlings in field cultivation.

The author has not realized the facts and significance of zonation, which are fundamental in this connection, and zonation is by no means a "superficial phenomenon." Zonation enables one to realize, for example, that a prominent,

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[22] JENSEN, C. A., Composition of *Citrus* leaves at various stages of mottling. Jour. Agric. Research **9**:157–166. 1917.

[23] WORSDELL, W. C., The morphology of the monocotyledonous embryo and of that of the grass in particular. Ann. Botany **30**:509–524. *figs. 10.* 1916.

projecting stem tip and a meristematic region that later develops such a tip are of the same ontogenetic significance, and therefore that a cotyledonary ring may be lateral even if the stem tip is not organized. The cells that are to organize it later are still apical. It certainly also gives a simpler and more consistent interpretation of the grass embryo than to imagine a cotyledon consisting of such distinct structures as scutellum, epiblast, and coleoptile, distinct in origin as well as in position and appearance. The author disposes of the dicotyledonous embryo of *Agapanthus* as meaning a "progressive" character, from which we are to infer that he still maintains the view that the dicotyledons have been derived from the monocotyledons. We had assumed that this view was no longer under discussion.—J. M. C.

Temperature and viability.—WAGGONER[24] finds that the resistance of radish seeds to high temperature is inversely proportional to the initial water content at the time of heating. At effective temperatures the water content fell with duration of heating. Three different varieties studied showed similar resistance. WAGGONER finds that much of the past work on resistance of seeds to high temperatures lacks precision because the operators allowed the water content to vary greatly during heating. They heated in water in open dishes, in the oven, or in dry corked flasks. The water absorbed or given off by radish seeds during heating as determined by the use of one or the other of these methods goes far to determine their resistance to heat. GROVES[25] has taken care of this source of error by securing his seeds gas-tight in tubes just large enough to hold the 100 seeds, thus leading to a rapid rise of vapor pressure with heating and an equilibrium between the vapor of the air and the water content without measurable water loss. It is interesting to see that radish seeds can be dried down to 0.4 per cent moisture without injury, for EWART[26] has concluded that the sorts of seeds that are most resistant to drying cannot withstand a moisture reduction below 2 or 3 per cent without injury; while *Oxalis*, *Salix*, and *Populus* will not withstand any drying in a desiccator.—WM. CROCKER.

Organic nutrition of plants.—KNUDSON[27] has investigated the influence of certain mono- and disaccharides, added to nutrient media, on the growth of various green plants, as corn, peas, radish, vetch, etc. These plants can absorb through the root system and utilize sugars in growth. The order of the sugars with reference to beneficial effects varied with the kind of plant. Thus with corn grown in the light, the order was glucose and fructose, saccharose, maltose;

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[24] WAGGONER, H. D., The viability of radish seeds (*Raphanus sativus* L.) as effected by high temperatures and water. Amer. Jour. Bot. **4**:299–313. *fig. 1*. 1917.

[25] BOT. GAZ. **58**:169–189. 1917.

[26] Ewart, Proceedings and Trans. of the Liverpool Biol. Soc. **10**:185–193. 1896.

[27] KNUDSON, LEWIS, Influence of certain carbohydrates on green plants. Cornell Agric. Exp. Sta. Mem. **9**:1–75. 1916.